AN ANALYSIS OF FIFTH-GRADE GEOGRAPHY WORKBOOKS ON THE BASIS OF THE MENTAL PROCESSES INVOLVED

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THESIS

AN ANALYSIS OF FIFTH GRADE GEOGRAPHY WORKBOOKS ON THE BASIS OF THE MENTAL PROCESSES INVOLVED

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CHAPTER I

INTRODUCTION

Purposes of the Study:--The purposes of this study are to analyze and classify the questions and exercises in a number of typical workbooks published for supplementary use in fifth-grade geography, on the basis of the types of mental processes required to answer the questions, to do the exercises, and to determine the extent to which these questions and exercises require the use of the higher mental processes as defined in this study.

During recent years educational authorities, including philosophers, psychologists, subject-matter experts, textbook writers, administrators, and teachers, have been emphasizing the need for greater stress on the training of children in the habits, attitudes, and skills of good thinking as a part of good democratic living.

The viewpoint that education is the mere acquisition of knowledge is rapidly declining, and education of a more functional nature, concerned with the meeting and solving of lifelike problems is steadily gaining favor. John Dewey[1] has said, "The assumption that information, which has been accumulated apart from use in recognition and solution of a problem,may later on be freely employed at will by thought,is quite false. The skill at the ready command of intelligence is the skill acquired in the course of thinking."

1/John Dewey, How We Think, D. C. Heath and Company, Boston, 1910.,p. 53

Symonds[2] points out that thinking is a complex art, capable of being divisible into components, and that each of these components is a matter of skill in learning itself. Further analyses of the thinking process have revealed a number of different levels or stages of thinking, some simple and others more complex and of a higher nature.

Judd[3] considers memorization, or recall, a low grade of mental activity involved in a course without developing equal facility in other types of mental processes involved. It is in the cultivation of these higher mental processes that greater stress must be placed in making our educational program fit the needs of children in preparing them for life in a democratic world. Caswell[4] sums it up when he states, "In a world that depends so largely on intellectual processes,as does the present one, it is unfortunate if at any point in the educational program full opportunity is not taken to cultivate these processes."

The higher mental processes are considered, for purposes of this study, to include those involving mental activity of a higher nature than recall or acquisition of facts, namely: organization and subordination of ideas; supplementation and use of ideas; and criticism and evaluation of ideas.

2/Percival M. Symonds, Education and the Psychology of Thinking, McGraw-Hill Book Company, Inc., New York City, 1936., p. 183.

3/Charles Hubbard Judd, Education as the Cultivation of the Higher Mental Processes, The MacMillan Company, New York City, 1936., p.15.

4/Hollis L. Caswell, Education in the Elementary School, American Book Company, New York City, 1942., p. 6.

One of the principal problems in teaching skill, in the use of the higher mental processes, has been the lack of suitable materials for instruction, which give effective practice in the use of these processes. Durrell[5/] has suggested that this is a promising field for research and that:

> Workbooks might be developed for teaching classification, organization and subordination of ideas, leading to outlining and summarizing; for supplementing and using ideas, raising questions, finding examples and applications, making plans for activities related to the topic; discriminating fact from opinion; criticizing method of presentation or suitability for a particular purpose, and discovering overgeneralizations.

The field of social studies has long been held to be a field in which clear thinking is an essential and which offers excellent opportunities for training in the ability to use the higher mental processes. Most all statements of desirable objectives of social studies instruction include training in this type of thinking as one of the important objectives.

Since the early 1920's writers of textbooks, realizing this trend, have been putting out great numbers of so-called "workbooks" or "study guides" to accompany their textbooks and to provide supplementary exercises designed to achieve some of these objectives and promote more effective learning. Nearly every textbook, in a field such as geography, has its accompanying workbook. The value of these workbooks as effective materials for instruction has been the subject of much discussion among educators. This gives rise to the question of whether these workbooks, in a given social studies field offer exercises which can be of

5/Donald D. Durrell, "Language and Higher Mental Processes," Review of Educational Research, 13:110-14, April, 1943.

value for the training of pupils in the use of the higher mental processes as described above, or whether they are concerned primarily with the use of mental processes on a lower level such as acquisition and recall of facts. The writer, through this study, hopes to be able to shed some light on this question.

CHAPTER II

REVIEW OF RELATED STUDIES

Although there has been a considerable amount of research done on the nature of, and training in, the thinking process, scientific studies related directly to this problem are somewhat limited. An attempt will be made in this chapter to review some of the more pertinent of these studies concerned with the nature of the thinking process, especially with regard to the higher mental processes, the nature and development of the thinking processes of children, results of training and instruction in the development of the higher mental processes in school children, and the use of special workbooks or special study materials in developing mental processes.

Probably one of the pioneer works in the field of the nature of the thinking processes is that by Dewey[1/] who holds that the origin of thinking is a felt difficulty, state of doubt, or perplexity. He differentiates the thinking process into ordinary thinking and reflective thinking, which he analyzes as having five distinct phases or steps: (1) the occasion of reflection, (2) the definition of the difficulty, (3) the rise of selections, (4) the mental elaboration of suggestions, and, (5) finding evidence in fact and conclusion or testing the hypothesis by overt or imaginative action. He holds that reflective thinking is distinguished from ordinary thinking in that it includes a

1/John Dewey, How We Think, D. C. Heath and Company, Boston, 1910, pp.15-16.

conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality.

Symonds[2/] criticized Dewey's five steps to reflective thinking as not satisfying all conditions and claims that the Dewey philosophy was synthetic rather than analytic. He points out that thinking is a complex act, capable of being divisible into components, and that each of these components is a matter of skill and learning in itself. In trying to maintain an analytic approach to the study of thought processes Symonds conducted an experiment in which a number of graduate students attempted to analyze their own thought processes in solving certain types of questions in order to determine the separate mental processes involved. He tried to fit this information together and organize it systematically into a simple, hierarchic system, but discovered that a simple pattern did not develop, the more complex processes using some of the simpler processes as constituents. He finally concluded that, "there seemed to be an interpenetration of mental processes in thinking at all levels which did not permit one to say that this process was more elementary than that."

These processes were finally arranged in some semblance of order, which indicated a hierarchy of levels in the following manner:

1. Fundamental psychological processes.
2. Concepts
3. Organization of concepts.
4. Judgments
    a. Judgment of fact.
    b. Judgment of value.
    c. Evaluation
5. Organization of judgments.

2/ Percival M. Symonds, Education and the Psychology of Thinking, McGraw, Hill Book Company, Inc., New York City, 1936., p. 183.

6. Syllogistic Reasoning

7. Argument - the organization of syllogisms.

He found, however, that certain processes such as analysis, selection, generalization, and organization seem to occur frequently suggesting that most processes of reasoning depend upon these fundamental operations.

Judd[3/], in analyzing human thinking as revealed by language usage, states, "Active thinking tends in the direction of synthesis of ideas. The mind does not dwell upon isolated items of experience but combines these items into integrated systems," He classifies memorization, or recall, as a lower order than many other mental processes such as application of principles and drawing inferences,[4/] and further states, "The higher mental processes associate or integrate the items, and this builds up a new subjective whole. This is of a different order than the mere sequential association which appears in memorization."[5/] ---"Relational thinking is dependent in large measure on the ability to express relations by means of verbal symbols, and yet it often appears that a given individual uses verbal symbols without performing fully the mental synthesis which the relational expressions imply."[6/]

3/Charles H. Judd, Education as the Cultivation of the Higher Mental Processes, The MacMillan Company, 1944. p. 30.

4/Ibid., p. 18.

5/Ibid., p. 19.

6/Ibid., p. 33.

One of the pioneer studies which led to much further study and discussion in the field of the nature and development of children's think- was that by Jean Piaget[7] who was one of the first to use the clinical method in studying children's thought processes. In his studies he found what he believed to be three general stages in the development of causal thinking in children. His findings indicated that the child up to six years of age is pre-logical in his thinking, his thought being characterized by finalism, artificialism, and animism, and his associations mere juxtapositions. Between the ages of six and eight he makes rapid improvement. Egocentrism wanes and social interest increases. This development continues until the age of twelve when he shows full mastery of all fundamental processes involved in logical thinking. He advances the conclusion that "children's thinking proceeds from egocentrism to socialization and that in causal explanation there is an effort to adapt oneself to the external world, to objectify, and perhaps depersonalize one's thought. Egocentrism acts as a hindrance to the adaptation and depersonalization of thought."

Subsequent studies on logical thinking with American children by Johnson and Josey[8] found little evidence of egocentrism at six years of age, but found instead that children of that age were quite socially minded and able to adopt hypotheses. There was no evidence of juxtaposition in their reasoning or drawing. A possible explanation of this

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7/Jean Piaget, The Language and Thought of the Child, Harcourt, Brace and Company, Inc., 1926.

8/E. C. Johnson and C. C. Josey, "A Note in the Development of the Thought Forms of Children as Described by Piaget," Journal of Abnormal and Social Psychology, 26:338-39, October-December, 1931.

was suggested in that, (1) their group was slightly superior in intelligence and economic status, and (2) that the English language was perhaps superior to the French as an instrument for logical thinking. Several studies have been made concerning the relation of age and maturity to reasoning ability.

Burt[9/] found that all the elementary mental mechanisms essential to formal reasoning are present by the mental age of seven if not somewhat before. He indicates that the evidence shows that children have the ability to reason at an early age and that reasoning continues to develop during childhood and adolescence. He holds that the development of this reasoning ability seems to consist essentially in an increase in the number, variety, originality, and compactness of the relations which the mind can perceive and integrate into a coherent whole.

Jensen[10/] also found that, "Children's thought processes are not qualitatively different from those of adults. As language develops, experience accumulates and mental age increases, the number and richness of concepts accumulates and richness of concepts increases correspondingly."

9/C. Burt, "The Development of Reasoning in School Children," Journal of Experimental Pedagogy, 5: 67-77, 1920. pp. 121-127.

10/Kai Jensen, "The Social Studies," 38th Yearbook of the National Society for the Study of Education, Part I, The Public School Publishing Company, Bloomington, Illinois, 1939. pp. 325-360.

Hazlitt[11] also differs with Piaget and holds that children can see relations at a very early age and suggests that the egocentrism mentioned by Piaget resulted from lack of experience in seeing relations in the environment.

The study by Deutsche[12] on children's causal thinking in which she used a group-testing technique which allowed children to give their own individual interpretations, without forcing them into prescribed categories, gave evidence that Piaget's classification of causal thinking into three stages and seventeen types did not apply. This study concludes that causal thinking does not develop by stages, but by a gradual process, and that certain types of answers do not seem to be characteristic of children of certain ages.

Croxton[13] conducted an experiment with elementary-school children to discover when the children in the various grades were able to generalize readily without explanation by the teacher. The experiment tested the pupils' ability to formulate and apply a principle after eight minutes of exposure to the essential experience basis in the form of demonstration, or directed play. Data from the experiment indicated

11/V. Hazlitt, "Children's Thinking," British Journal of Psychology, 87:497-531, 1930, as cited by Jean Marquis Deutsche, "The Development of Children's Concepts of Causal Relations, The University of Minnesota Press, Minneapolis, 1937., p. 9.

12/Jean Marquis Deutsche, The Development of Children's Concepts of Causal Relations, The University of Minnesota Press, Minneapolis, 1937., p.99.

13/W. C. Croxton, "Pupils' Ability to Generalize," School Science and Math, 36: 627-634, June, 1936.

that many children in the higher primary, the intermediate, and the junior high school grades are capable of generalizing and that junior high school pupils do not possess markedly superior ability to intermediate pupils, the difference in scores in favor of the former being little more than might reasonably be credited to added experience.

Raths[14] developed an experimental test which would give evidence about the thinking ability of children in the elementary grades. From the results of these tests he concluded that thinking is characterized by three major types of errors:

1. Errors due to ignorance.
2. Errors due to overcaution or uncertainty.
3. Errors in which the child goes beyond facts and marks a statement true or false when the evidence is insufficient.

The following studies were conducted with regard to certain specific types of thinking abilities such as problem solving, generalizing, association of ideas in reading, and reading comprehension.

Heidbreder[15] experimented with adults and children of various age levels to observe and study behavior in response to similar problem situations involving discovering a key or method for solution. Evidence obtained from this study indicated that the activity involved in solving problems includes several modes of reaction which show a gradual develop-

14/Louis Raths, "A Thinking Test," Educational Research Bulletin, 23: 72-75, March 15, 1944.

15/Edna Heidbreder, "Problem Solving in Children and Adults," Journal of Genetic Psychology, 35: 522-545, 1928.

ment with increasing maturity. The following conclusions were drawn from the study:

1. The general ability to solve problems increases with age.

2. Responsiveness to problems as such also increased with maturity-there was no observable occurrence in the 3-year old group, distinctly but only occasionally present in the four year old level, very prominent in 6-10 year old children and definitely associated with self-feelings and emotional reactions, adults also exhibited self regarding sentiments but in less emotional forms.

3. There was gradual emergence of a general form, pattern, or mode of procedure which became more definite but never rigidly set as age increased.

4. There was evidence indicating development from less adaptive to more adaptive modes of response with increasing age.

5. There is a gradual change from a more subjective to a more objective attitude toward the problem as a whole.

Peterson[16/] tested pupils in grades 5-12 in Chicago schools with a series of problems involving a general principle with a view to discovering the trend of ability in solving them and the correlation of this ability with age, intelligence, and grade in school, and any sex differences which might occur. He found a positive correlation between the four variables--age, intelligence test scores, the ability to solve problems involving a general principle, and grade in school. No relation was found between age and the ability to solve such problems when grade in school was held constant, but some positive correlation was found between intelligence scores and such problem solving ability. There was some

16/G. H. Peterson, "An Empirical Study of the Ability to Generalize," Journal of General Psychology, 6: 90-114, 1932.

positive correlation between grade in school and the ability to solve such problems when age and intelligence are both partialled out. Grade in school gave the highest, zero order coefficient with scores on this test. He found slight sex differences favoring the males in solving such problems which could not be accounted for in any other way. It was further noted that when the amount of demonstrational guidance was decreased there was a decrease in the ability to solve the problems. He finally concludes "that schooling is more closely related than intelligence, as the latter is measured by any type of test, to an ability which many would regard as a significant intellectual function."

Bedell[17/] also studied the ability of boys and girls to recall and generalize items of general science material. He found that boys exceeded girls in the ability to generalize but there was no sex difference in the ability to recall.

Tyler[18/] computed coefficients of correlation between scores made by college students on examinations of three types; the first requiring mere recall of information taught in the course, the second requiring both the recall of principles and their application to situations that

17/R. C. Bedell, "The Relationship between the Ability to Recall and the Ability to Infer in Specific Learning Situations," Bulletin Northeastern Missouri State Teachers College, 34: 55, 1934, as cited by Jean Marquis Deutsche, The Development of Children's Concepts of Causal Relations, The University of Minnesota Press, Minneapolis, 1937 p. 10.

18/Ralph W. Tyler, "The Relation Between Recall and Higher Mental Processes," Chapter II in Charles Hubbard Judd, Education as the Cultivation of the Higher Mental Processes, The MacMillan Company, New York City 1936.

had not been presented in the course, and the third requiring the students to draw inferences from data that had not been presented before, with the purpose of comparing the students recall of information taught in a course with his success in carrying on higher mental processes. The coefficients obtained from many varying courses showed consistently low correlations between scores made in recall and the higher mental processes of applying principles and drawing inferences. The lowest correlations were found between recall and the ability to draw inference. In many cases pupils who scored highest in recall were below average in application and inference. He concludes that, "memorization of facts frequently fails to result in the development of higher mental processes."

Grim[19/] constructed tests involving interpretation of data from various kinds of social science facts in which pupils were directed to check valid interpretations, items which were probably true or probably false, and those interpretations not warranted by data. Results of these tests were correlated with scores on standardized reading and progressive achievement tests. The correlations obtained indicated that the pupil who rates high in reading ability may not stand equally high in his ability to interpret social data. Achievement appeared to be related to the ability but the correlation was not positive enough for accurate prediction.

19/P. R. Grim,"Interpenetration of Data and Reading Ability in the Social Studies," Educational Research Bulletin, 19: 372-74, September 25, 1940.

A study by Gans[20] to determine the ability of children in grades four, five, and six to read critically to find information relevant to a problem under consideration and to learn the degree to which this ability is related to comprehension showed that reference reading is a composite ability which includes reading ability, selection-rejection ability, and shows some influence of delayed recall. The conclusions further indicated that general reading comprehension is being developed in our schools with no regard for the wisdom of accepting the printed word.

Dean[21] conducted an experiment in grade 4 with samples from standardized tests in reading comprehension in order to determine the order of difficulty of various types of reading comprehension. The order of difficulty as shown by the study was:

1. Reading for the main points - factual answers.
2. Reorganizing material.
3. Drawing inferences from facts not overtly stated.
4. Judging the relative importance of various facts.

She found that all children except the very bright have more trouble with type four than any other type. The coefficient between mental age and grade scores was found to be .50 $\pm$ .07.

20/Roma Gans, Critical Reading Comprehension in Intermediate Grades, Columbia University, Bureau of Publications, New York City, Teachers College Contributions to Education, No. 811, 1940.

21/Alice M. Dean, "A Study of the Range and Type of Comprehension in Fourth Grade Reading," reported by Gerald A. Yoakum in "Research Studies in Worktype Reading: A Summary of Work Done at One University," Journal of Educational Research, 29: 532-43 March, 1936.

Some studies have been made concerning the results of training and instruction in the development of the higher mental processes.

Johnson[22] carried on an experiment with two high school classes in geometry in an attempt to determine whether training in the conscious use of a technique of logical thinking aided in the proving of geometry theorems and whether it increased the pupils' ability to analyze and see relationships in other non-geometrical situations. The experimental group worked with problems in real life situations and were shown they could be solved by a definite train of mental processes similar to Dewey's five steps in reflective thinking. The class was also given training in solving original exercises in geometry using the same procedure. Tests were given at intervals to both experimental and control groups and the results were compared.

In all cases the scores showed greater gains by the experimental groups and offered evidence that when pupils are taught to use, consciously, a technique of logical thinking, they try more varied methods of attack, reject erroneous suggestions more readily, and without being discouraged, maintain an attitude of suspended judgment until the method has been shown correct. Results of reasoning tests in other than geometry showed similar gains by the experimental group, showing some carry-over of methods and attitudes to other problem situations.

22/Elsie Parker Johnson, "Teaching Pupils the Conscious Use of a Technique of Thinking," The Mathematics Teacher, 17: 191-201, April, 1924.

Daily [23] experimented with ninth grade pupils in algebra, using tests made up of problems containing only essential data, and special problems containing superfluous data, in order to determine to what extent the habits of selecting and demanding essential and adequate data can be developed by suitable instruction. An experimental group was given special instruction and drill, designed to develop this ability. The scores of this group, when compared with those of a control group, showed gains in favor of the experimental group and indicated that it is possible by means of specific instruction to teach pupils to consciously exercise this desirable function. Results of tests in other non-mathematical situations showed corresponding improvement in ability to select data for problems in other fields of learning. He concludes that superior results are obtained when pupils are taught consciously to apply these processes and are given practice under guidance.

Newlun [24] found through an experiment with fifth grade groups, in giving training in summarizing in history that "summarizing in history, if properly developed and used, can improve the achievement in history more than ordinary study to prepare for topical or question and answer recitations of the type used by teachers in this experiment." He contends that the making of summaries is more effective to the extent that it calls on a thinking process of a constructive or problem-solving nature than if merely a process of remembering and arranging of facts

23/Benjamin W. Daily, The Ability of High School Pupils to Select Essential Data in Solving Problems, Teachers College Contributions to Education No. 190, Columbia University, (New York City) Bureau of Publications, 1925.

24/Chester Otto Newlun, Teaching Children to Summarize in Fifth Grade History, Teachers College Contributions to Education, No. 404. Columbia University, Bureau of Publications, New York City, 1930.

selected by others. The most important skill in summarizing was found to be the ability to distinguish between the important and the less important for the purpose in mind.

Anderson, Marcham, and Dunn[25] used two experimental procedures of telling or explaining, and doing in teaching skills of (1) identifying specific facts, (2) selecting relevant facts, (3) organizing facts, in terms of meaningful sub-topics, (4) arranging sub-topics in logical order, (5) making inferences from specific facts and from trends, (6) distinguishing between fact and opinion, and (7) reorganizing situations in which insufficient evidence makes it difficult or impossible to draw a clear-cut conclusion. Carefully prepared tests were given at various grade levels to measure the skills stressed in the experimental materials. Test I measured ability in abstracting and organizing information, while Test II measured ability to draw conclusions. Results showed negligible differences between gains made using the two experimental methods, but the results of these when compared with those from groups not receiving experimental training showed that they did about as well on Test I, but the experimental groups made much higher gains on Test II. They suggest that the critical thinking problems used made their most important and distinctive contributions in developing skills associated with the making of inferences and the ability to draw conclusions.

25/Howard C. Anderson, Frederick G. Marcham, and Seymour B. Dunn, "An Experiment in Teaching Certain Skills of Critical Thinking," Journal of Educational Research, 38: 241-251, December, 1944.

Salisbury[26] found through use of carefully prepared lessons in outlining and summarizing with equated experimental and control groups that:

1. Training in conscious use of outlining and summarizing as a method of study when taught through practice with general materials will transfer to specific study situations and tend to improve mastery of content subjects.

2. Results of such training also indicated transfer in improvement in general thinking and reasoning ability as tested by problems not related to the specific school curriculum.

3. Improvement in thinking, as exemplified in reading comprehension, reasoning, and understanding of comprehensive units of subject materials can be achieved in the public schools under normal classroom conditions by giving pupils directed practice in outlining and summarizing.

Helseth[27] found that children in the seventh and eighth grades when encouraged to ask questions with regard to U. S. History and to answer these questions according to their own plans with more conscious attention given to methods of study than to recitation of facts already gained, made considerable gains in development of skill in thinking and that other values from history study are retained though the attention be chiefly placed on method of study.

Glaser[28] used experimental teaching methods with groups in twelfth grade English classes in which special training was given

26/Rachel Salisbury, "A Study of the Transfer Effects of Training in Logical Organizations," Journal of Educational Research, 28: 241-254, December, 1934.

27/Inga Olla Helseth, Children's Thinking, "Teachers College Contributions to Education," No. 209, Columbia University, Bureau of Publications, New York City, 1926.

28/Edward M. Glaser, An Experiment in the Development of Critical Thinking, "Teachers College Contributions to Education," No. 843, Columbia University, Bureau of Publications, New York City, 1941.

designed to cultivate attitudes and skills of critical thinking. Evidence from tests administered before and after training showed significantly greater gains in ability in critical thinking in the experimental groups. Some evidence of transfer of the disposition and ability to think critically was shown in other situations especially in the attitude of wanting evidence for beliefs.

Arnold[29/] conducted an experiment with fifth and sixth grade pupils on the teaching and testing use of data, or the ability to do critical thinking. He concluded that the intelligent use of data can be tested at the fifth and sixth grade level, and that critical thinking can be taught in the elementary school whenever time is taken to give adequate consideration to our purposes and procedures.

A series of experimental tests to determine the effectiveness of the teaching of critical thinking in the elementary schools were made and administered by Wrightstone[30/]. The tests were constructed especially to test the ability of pupils to:

1. Obtain facts.
2. Interpret Facts.
3. Apply the conclusions to new or special situations.

29/Dwight L. Arnold, "Testing Ability to use Data in the Fifth and Sixth Grades," Educational Research Bulletin, 17: 255-594, December 7, 1938.

30/J. Wayne Wrightstone, Appraisal of Newer Elementary School Practice Columbia University Press, New York City, pp. 221, 1938.

The tests were administered in a number of experimental schools in which critical thinking had been a major objective of teaching, as well as in a number of other schools which did not have this as a definite objective. Scores, although not statistically significant, definitely favored the experimental schools. The author concludes that quality of pupil thinking can be improved by proper instruction and by provision for its practice.

The following studies are concerned with the value of workbooks or printed study guides in developing pupil ability in various aspects of thinking and achievement.

Tyson[31/] made a comprehensive study of 161 workbooks available to teachers in the social sciences in order to determine the general classifications into which they fell, the plans of organization used, and the general nature of their contents. The results showed six general classes on three different bases. On the basis of limit of contents he found two types: the specific type, based on one text; and the general type based on a number of sources. On the basis of content, they were classified as the manual type and the workbook proper, made up mostly of filling-in exercises. On the basis of use, they fall into two classes, those intended primarily for diagnostic work, and those that place the main emphasis on guiding study. Some were found which defied classification and some which combined features of others.

31/R.M. Tyson, "The Development and Appraisal of Workbooks in the Social Sciences," School Review, 46: 17-31, January, 1938.

This study showed that the unit type organization was about four times as frequent as other forms, which included organization by parts, divisions, unit problems, problems, topics, chapters, periods, contrasts, exercises, blocks, epochs, and sections.

With regard to nature of content the study showed that workbooks of the manual and workbook-proper types were much alike, except for the use of filling-in exercises. Those of the workbook-proper type were much more numerous and these consisted largely of tests, references, outline maps, previews, outlines, and an assortment of filling-in exercises. Tyson concludes that the workbook of the manual type is more satisfactory, because it is more conducive to the establishment of desirable study habits, and is more challenging. He suggests the general unsuitability of workbooks for social sciences, resulting in a gradual dying out of the workbook movement, or in replacement by special teacher-constructed guide sheets or work sheets, which will better serve the purpose.

Horn[32/] made a similar analysis of over a hundred workbooks in the social studies, published since 1920. He summarized a great many opinions regarding them and compiled a comprehensive list of arguments for, and against, their use. He concludes that, "Workbooks vary enormously in the degree to which either these alleged benefits or limitations apply. Very few of them, however, merit the claims that are made for them, or are free from the objectionable features that have been

32/Ernest Horn, Methods of Instruction in the Social Studies, Charles Scribners' Sons, New York City, 1937.

enumerated.----Few of the exercises are likely to stimulate either careful reading or critical reflection. Many, such as the filling out of completion blanks and the checking of true-false or multiple-choice items, require only a superficial skimming of the text in order to locate a work or phrase that is the key to the correct response. It seems likely, with very few exceptions, the workbooks in use tend to increase rather than offset the formalism and verbalism, that in the past have pervaded the teaching of the social studies."

An experiment by Crawford and Hamren[33/] using printed or mimeographed study guides used alternately with experimental and control groups in the twelfth grade, showed, on the basis of results of objective and essay tests, considerable uniformity with which results favor the use of study guides both then on tests given immediately after the experimental period and on a subsequent test given two months after the end of the experiment to measure retention or permanence of results.

Cressman[34/] found that junior high school groups using printed workbook forms requiring written answers in working out a series of life-like conduct problems upon which the pupil must form an opinion, and make a judgment, exceeded, by a wide margin, groups which received oral presentation of the problem, followed by class discussion in a standardized Good Citizenship Test. He concluded that the results were not conclusive, but seem to show that the workbook method is superior to the

33/C. C. Crawford, and Lloyd Herbert Hamren, "An Experiment with the Use of Printed Study Guides," Educational Method, 40: 541-544, June, 1930.

34/Elmer W. Cressman,"Workbooks versus Oral Instruction," Journal of Educational Sociology, 7: 250-253, December, 1933.

ORAL method - particularly in getting transfers to materials different from those used in training.

Nelson[35] however, in a similar experiment with classes in civics, found that the use of a workbook had no statistically significant effects on the achievement of the group using it.

Reeder[36] employed the technique of using objectively scorable study questions as a form of lesson assignment in order to determine whether they improved the quality of study in Geography in the upper grades of the elementary school. The experimental groups were given study sheets containing page assignments as well as study questions of various types and were told to follow the written instructions in studying the assignment. The control groups were given no questions for study, but were simply instructed to study the assignment as best they could. Groups were equated by the rotation methods. Results based on scores on tests given at the end of the experimental periods, and on evaluation of subjective data, showed definitely measurable gains in favor of the experimental group. Conclusions indicated that the questions lead the pupil to think, reason, or summarize on the basis of facts given in the text, to take notes on the material studied and to amplify quantitative statements through computations which deal with familiar relationships, and thus improved in an important way the quality of study.

35/Clayton Nelson, "The Effectiveness of a Specific Workbook in Learning American Government," Unpublished Masters Thesis, University of Iowa, cited by R. M. Tyson, "The Development and Appraisal of Workbooks in the Social Sciences," School Review, 46: 17-31, Jan. 1938.

36/Edwin Hewitt Reeder, A Method of Directing Children's Study of Geography, Teachers College Contributions to Education, No. 193, Columbia University, Bureau of Publications, New York City, 1925.

Mead[37] evaluated 23,840 learning exercises in junior and senior high school history in an attempt to discover the relative amount of emphasis given by authors to particular abilities, and to compare various classifications of workbooks in this respect. She tried to frame a classification of abilities which would harmonize with the opinions of psychologists, experts on the subjects of study, and other research works, and finally developed a table which showed the distribution by number and per cent of the 23,840 learning exercises among these separate abilities which included both mental abilities and abilities not primarily mental, but believed not to be entirely separate. This table is reproduced below:

ABILITY	NUMBER	PER CENT
Collecting Data	10,093	42.3
Remembering	2.346	9.8
Expressing Oneself	2,305	9.7
Observing	1,506	6.3
Organizing	1,403	5.9
*Comparing	1,298	5.4
*Finding Causal Relationships	1,101	4.6
*Judging or Evaluating	931	3.9
*Explaining a conclusion	727	3.1
Comprehending	695	2.9
Imagining	495	2.1
*Drawing Conclusions from data	475	2.0
*Analyzing	182	0.8
*Drawing Inferences	110	0.5
*Initiating	99	0.4
Classifying	43	0.2
*Applying conclusions	31	0.1
Total	23,840	100.0

37/Vera Albert Mead, "What Abilities are Stressed in Workbooks in History," School Review, 47: 284-289, April, 1939.

The results of this study show that learning exercises in high school are devoted chiefly to the ability to collect data and three-fourths of the exercises deal with remembering, expressing oneself, observing, and organizing, in that order, Abilities which are commonly accepted as problem solving abilities involve only about 20 per cent of the exercises.

Workbooks for use in the higher grades showed slightly higher emphasis on comparing, explaining conclusions, and analyzing. She concludes that workbooks offer a great number of exercises which provide training in a variety of abilities and that, although they disagree individually on the amount of emphasis given to each ability, the tendency to stress non-problem-solving abilities is the dominating characteristic, when the books are considered collectively.

Of particular interest to this particular problem is the study by Phillips[38/] in which she classified the questions and exercises in ten fourth grade geography text books on the basis of the mental processes required to answer the questions and to do the exercises. She classified the mental processes used under the headings of, (1) recall, (2) organization, and (3) supplementation and use of ideas, and (4) Criticism and evaluation of ideas. All of the questions and exercises found at the end of chapters, or other definite sections of the text, in the text itself, and under maps, pictures, and diagrams wereanalyzed and classified under numerous sub-headings. Conclusions of this study showed that out

38/Laura D. Phillips, "An Analysis and Classification of the Questions and Exercises in Ten, Fourth-Grade Geography Books," Unpublished Master's Theses, Boston University, 1945.,pp. 68-70.

of 9,483 questions and exercises in the ten texts, 7,686 or 81.05 per cent were classified as recall, and only 1,797 or 18.95 per cent were classified as requiring the higher mental processes indicating that the contribution of the ten geography books used in this study to the training of the higher mental processes is negligible.

Many of the studies herein reported have indicated that training in the use of the higher mental processes is effective with children under the proper circumstances. It has been shown, however, that much of the regular textbook material now in use in the public schools has made little contribution toward such training.

The writer, through a similar procedure to that employed by Phillips in a previously mentioned study with fourth-grade geography textbooks, hopes to show what contribution the supplementary workbook material published in the field of fifth-grade geography makes toward such training in the use of the higher mental processes.

CHAPTER III

PROCEDURE USED IN THE STUDY

Classification of Mental Processes:- In order to make possible an analysis of the questions and exercises in fifth-grade geography workbooks, it was necessary to set up a classification of the various types of mental processes required for the completion of such questions and exercises. The classification finally adopted was derived from the studies of such experts in this field as Judd[1], Marcham[2], Durrell[3], and other experimental studies such as those by Phillips[4], Mead[5], and Dean[6].

1/Charles Hubbard Judd, Education as the Cultivation of the Higher Mental Processes, The MacMillan Company, New York City, 1936., pp. 106-137.

2/Frederick George Marcham, "The Nature and Purpose of Critical Thinking in the Social Studies," Thirteenth Yearbook of the National Council for the Social Studies, National Education Association, 1942., pp. 1-48.

3/Donald D. Durrell, "Language and the Higher Mental Processes," Review of Educational Research, 13: 110-114, April, 1943.

4/Laura D. Phillips, An Analysis and Classification of the Questions and Exercises in Ten Fourth-Grade Geography Workbooks, Unpublished Masters Theses, Boston University, 1941.

5/Vera Albert Mead, "What Abilities are Stressed in Workbooks in History," School Review, 47: 284-289, April, 1939.

6/Alice M. Dean, "A Study of the Range and Type of Comprehension in Fourth-Grade Reading," Master of Arts Thesis, 1932. Reported by Gerald A. Yoakum, "Research Studies in Work Type Reading: A Summary of Work Done at One University," Journal of Educational Research, 29: 532-543, March, 1946.

This classification was divided into four separate levels or divisions. The lowest level,under the general heading of Lower Mental Processes, was considered to include those questions and exercises requiring only the recall or recognition of simple, factual answers for these solutions. Under the general heading of Higher Mental Processes, three separate levels were set up under the headings of: Organization of Ideas, Supplementation and Use of Ideas; and Criticism and Evaluation of Ideas.

Each of the four levels or divisions was further sub-divided into a number of more specific processes, which were considered to be representative of each of the major divisions or levels of mental processes. It is realized that some dissension might occur over the various sub-classifications employed by the writer. However, since the major purpose of this study is to obtain a comparison between the extent to which the questions and exercises require the use of the higher mental processes and the extent to which they require only the use of the lower mental processes; this should not materially affect the results of the study.

It is apparent that, in many cases, a certain amount of overlapping or interpenetration of the various classifications may occur in a single exercise. In such cases, the classification which seemed most representative of that particular exercise was applied. In cases of doubt, the higher classification was applied.

For purposes of this study, the term "question" or "exercise" is used to denote each instance in which one complete answer or response must be made. In some cases, particularly in cases where the higher mental processes must be employed, this may require a number of smaller

responses to be made or steps to be taken in order to make a complete response.

Under the classification of recall, a distinction has been made between aided recall, in which certain definite context clues are provided, indicating specific factual answers, and unaided recall, in which the response is not specifically indicated or limited by context clues. The classification of recognition is used to designate those exercises in which the response or answer must be chosen or located among one or more responses furnished in the exercise, or on accompanying maps, diagrams, tables, or charts.

The highest classifications, namely, Criticism and Evaluation, was applied to questions and exercises only when they required careful analysis of data and ideas and involved careful judgment on the basis of a definite standard of values.

The procedure followed in analyzing the questions and exercises was, in general, similar to that used in the previously reported study by Phillips, which analyzed and classified the questions and exercises in fourth-grade geography textbooks.

The classification of mental processes used in this study is as follows:

I Lower Mental Processes

A. Aided Recall

1. Facts in the text

2. Facts from other sources

B. Unaided Recall

1. Facts in the text

2. Facts from other sources

C. Recognition

1. Multiple Choice

2. True-False

3. Matching

4. Location of places or facts from data on maps, charts, diagrams, or tables.

D. Reproduction - drawing pictures, maps, diagrams, or charts, according to directions given.

II. Higher Mental Processes

A. Organization of Ideas

1. Select items pertinent to the topic

2. Classify and arrange

3. Find major or minor points

4. Outline

5. Summarize

6. Collect pictures, articles, clippings, etc., to illustrate a topic.

7. Prepare a special report.

B. Supplementation and Use of Ideas

1. Find examples or applications

2. Suggest plans for activities related to topic

3. Suggest additional topics for study

4. Show relationships

5. Apply knowledge or principles to new situations.

6. Draw conclusions or inferences from data supplied in text, maps, charts, diagrams, or tables.

7. Find or suggest reasons or explanations for facts or statements.

8. Make generalizations.

9. Handwork to illustrate a fact or principle.

10. Make comparisons.

11. Find differences or similarities.

12. Create or invent new combinations of ideas.

C. Criticism and Evaluation of Ideas

1. Recognizing special merit of ideas presented.

2. Finding exceptions to the point made.

3. Suggest limitations or precautions.

4. Analyze methods or motives.

5. Discriminate between fact and opinion.

6. Discovering bias or prejudice.

7. Discovering over-generalization.

8. Eliminate unimportant or irrelevant material.

9. Evaluating evidence or explanations.

10. Evaluating suitability of a presentation for a particular purpose.

Sample questions and exercises under each item in the classifications of mental processes used in this study:

I Lower Mental Processes

A. Aided Recall

1. Facts in text.

Name two clothing materials produced on New England farms.

The leading city in eastern Washington is_____.

2. Facts from other sources.

In which state do you live?

Where should you go if you wished to visit the places listed below. Refer to an encyclopedia or history if necessary.

(1) The place where the Pilgrims landed_____.

B. Unaided Recall

1. Facts in text.

List some crops grown by irrigation in the Western states.

2. Facts from other sources.

Name some necessities which could be manufactured from the following raw materials: Wool, Cotton, Hides, Iron.

C. Recognition

1. Multiple Choice.

Underline the correct ending for each sentence.

Gloucester is famous for its salted (codfish) (herring) (mackerel).

2. True-False.

Write "yes" before each statement that is true and "no" before each statement that is not true.

(1) The Mississippi Basin covers over two-fifths of the United States.

3. Matching

a. Where should you go to see these sights? Before each phrase in Group I write the number or numbers of the correct place from Group II.

GROUP I	GROUP II
_____a. Beautiful mountain scenery.	1. Allentown
_____b. Apple orchards and fields of corn, wheat, and hay.	2. Wilkes-Barre
_____c. Cement plants.	3. The Blue Ridge
_____d. Mills where rayon goods are made.	4. Scranton
_____e. Cattle grazing in pastures.	5. The Great Valley South of Harrisburg
_____f. Iron and steel plants.	6. Reading
_____g. Anthracite mines	

b. On the map of the Middle-Atlantic States on the opposite page natural regions and other physical features are indicated by numbers in circles, states by letters in squares, and cities by numbered black dots. Complete the map key by writing the numbers and letters in the correct places below.

4. Locating places and facts from data on maps, charts, diagrams, and tables.

a. Turn back to the outline map of the United States on Page 6. Find the six New England States and trace the boundary of each with a purple pencil if possible. Then neatly print the abbreviation of the name of each state in the correct place.

b. Find a mountain range, most of which is 2000 feet to 5000 feet high. Write the name of this area.

D. Reproduction - Drawing maps, charts, pictures, or diagrams according to directions given. Study the map of the South Atlantic and Gulf States on Page 16---On the chart below make a careful sketch of this region using the 30° and 35° parallels and the 80°, 85°, 90°, 95°, 100°, and 105°, meridians as guides. Draw in the state boundaries.

II Higher Mental Processes

A. Organization of Ideas.

1. Select items pertinent to the topic.

   Place a check beside the names of things below that you would use in talking about irrigation in the Northwest.

2. Classify or Arrange.

   a. Each of the following phrases describes the Appalachian region of Canada, New England, or both. Put a "C" before the phrases which describe Canada, and an "N" before those which describe New England. If a phrase describes both use both letters.

      _____1. Hilly surface
      _____2. Rainy climate
      _____3. No lowlands

   b. Number the sentences below in the correct order from 1 to 10 to tell a full story of cotton growing and marketing.

      _____1. The seeds are removed from the fibers.
      _____2. The cotton blossoms appear.
      _____3. The bales of cotton go to the railroads or
      _____4. The seeds are planted in the early spring.
      _____5. The cotton is packed in bales.
      _____6. Wagon loads of cotton go to the gins.
      _____7. The fields are plowed.
      _____8. The bolls begin to open.
      _____9. The farm workers "chop" the cotton.
      _____10. Workers pick the fibers from the bolls.

3. Find major and minor points.

   None found.

4. Outline.

   Under the following headings write in your own words valuable things which you can recall about the continent of North America, after you have read your textbook, Pages 303-308.

   1. Size and extent.
   2. Favorable commercial position.
   3. Relief of the land and drainage.
   4. Climate and Vegetation.
   5. Soil and Agriculture.

6. Power resources.
7. Mineral resources.
8. Manufacturing.
9. Distribution of population.
10. Scenery.

5. Make a Summary.

Select one of the provinces or a territory or a city in Canada, in Newfounland, or in Labrador for a special library study and make a summary of your reading.

6. Collect articles, pictures, etc., to illustrate a topic.

Read in current newspapers and magazines about the Mountain States and paste the most interesting clippings in the space below.

7. Prepare a special report.

Here is a sketch of a famous ship, called a clipper ship. Try to find out more about a clipper ship to tell your class.

B. Supplementation and Use of Idea.

1. Find examples or applications.

Give one example to prove that the highest and lowest lands in our country are in the western states. (Use maps on pages 18 and 19).

2. Suggest plans for activities to the topic.

None found.

3. Suggest additional topics for study.

Think of other questions about these states and be ready to answer them yourself; then test your classmates with your questions.

4. Show relationships.

Write a brief explanation of how each of the following things has helped the farmers of the Central States to be such good food producers.

a. Surface of the land
b. Soils
c. Rainfall
d. Growing season

5. Apply knowledge or principles to new situations.

a. Notice the farm map on Page 158 in your geography. Can you think of another way in which a farm in the mixed farming region could be arranged? On the above drawing, divide the farm into fields and show the crops.

b. What do you use in school that is made from the raw material shown in the picture on Page 35 of your geography.

6. Drawing conclusions or Inferences from data in text, maps diagrams, pictures, or tables.

a. Judging from the vegetation map, which states have areas of less fertile land.

b. What Fall-Line City am I?

(1) I am the largest city on Chesapeake Bay.
(2) I started as a seaport for the export of tobacco.
(3) I am an important manufacturing city.

My name is _____.

7. Find or suggest reasons or explanations for facts or statements.

a. Explain the advantage to transportation of the Mohawk Valley.

b. How does this map show you one advantage that Indianapolis has for manufacturing.

8. Make Generalizations.

Is the Central South mainly a farming or an industrial area.

9. Create or invent new combinations of ideas.

After you have read about Canada write an imaginary account of an imaginary trip to this country.

10. Handwork to illustrate a fact or principle.

    Make a product map of New England.

11. Make Comparisons.

    a. Turn to the rainfall map on Page 15 in your geography book. Is the rainfall in the Western South lighter, heavier, or about the same as that in the rest of the South.

    b. How does Canada compare in size with the United States? In population?

12. Finding similarities or differences.

    a. In many ways the crops of the Central South are like those of what other region you have learned about?

    b. How is the northern part of the Allegheny plateau different from the southern part?

C. Criticism and Evaluation of Ideas.

1. Recognizing special merit of ideas.

   What makes this New England resort a good vacation center? Would you enjoy staying here? Why?

2. Find exceptions to the point made.

   None found.

3. Suggest limitations or precautions.

   None found.

4. Analyze methods or motives.

   If you could fly to any part of the United States that you wished, where would you choose to go? Why?

5. Discriminate between fact and opinion.

   None found

6. Discovering bias or prejudice.

None found.

7. Discovering over-generalization.

None found.

8. Eliminating unimportant or irrelevant material.

Which one of the following words does not belong in a list of words about lumbering in the South?

shipbuilding	naval stores
turpentine	resin
bolls	furniture

9. Evaluating evidence or explanations.

Check the three reasons which best explain each of the following facts.

1. The Puget Sound lowland, with the Willamette Valley, is a fine farming region.

_____a. There is plenty of rain.
_____b. This region used to be heavily forested.
_____c. The growing season is at least six months long.
_____d. The summers are cool and the winters are mild.
_____e. The soils are rich.

10. Evaluating the suitability of a presentation for a particular purpose.

None found.

The Geography Workbooks chosen for this study are as follows:

1. Atwood, Wallace W., and Thomas Helen Goss, Workbook in Geography to accompany The American Nations, Boston: Ginn & Company, 1945.

2. McConnell, W. R., Experiences in Geography, Living in the Americas, New York: Rand McNally and Company, 1947.

3. McConnell, W. R., Geography Workshop, Geography of the Americas. New York: Rand McNally and Company, 1946.

4. McConnell, W. R., Study Guides in Geography, the United States and Neighboring Lands, St. Louis, Missouri: Webster Publishing Company, 1937.

5. Bodley, G. R., and Thurstone, E. L., Geography Workbook, North and South America, Syracuse, New York: Iroquois Publishing Company.

6. Stull, DeForest, and Hatch, Roy W., Geography Workbook for Journeys through North America, Boston: Allyn and Bacon, 1946.

7. Ridgely, Douglas C., and Howe, George F., Western Continents, A Study of North and South America, Bloomington, Illinois: McKnight and McKnight, Publishers, 1939.

8. Hance, L. S., and Naken Brand, W. W., Units in Social Studies, the Problems, Peoples, and Countries of North America, South America, Our Island Possessions, Grade V, Philadelphia: The John C. Winston Company, 1937.

CHAPTER IV

ANALYSIS OF DATA

The following tables present the data on the classification of the questions and exercises in the geography workbook used in this study. Tables IA through VA show the numerical distribution under the various classifications, while tables IB through VB show the percentage distribution under the same classifications.

Table IA shows the numerical distribution of the questions and exercises that were classified under the heading of Lower Mental Processes. There were 5254 questions and exercises classified under this general heading. Two thousand two of the questions and exercises were classified under Aided Recall. Of these one thousand nine hundred sixty-one were classified under Aided Recall of facts in the text, and forty-one were classified under Aided Recall from other sources. One hundred thirty-eight questions and exercises were classified under Unaided Recall. Of these, one hundred thirty were classified under Unaided Recall of facts in the text, while eight were classified under Unaided Recall of facts from other sources. Two thousand seven hundred seventy-three questions and exercises were classified under the heading of Recognition. Eight hundred eighty of these were classified under Multiple choice, five hundred twenty-nine were classified under True-False, five hundred sixty nine were classified under Matching, and seven

hundred sixty-one were classified under Location of facts and places on maps, charts, diagrams, pictures, and tables. Two hundred sixty-one were classified under Reproduction-drawing maps, pictures, diagrams, etc. according to directions in the text.

TABLE 1A

Numerical Distribution of Questions and exercises classified under Lower Mental Processes

Book	Aided Recall		Unaided Recall		Recognition			Reproduction		Total
	Facts in Text	Facts from other sources	Facts in Text	Facts From other sources	Multiple Choice	True-False	Matching	Locating & Indicating Facts & Places	Drawing Maps, Pictures, by Directions In Text	
1	327	7	20	0	173	68	118	38	0	751
2	255	1	13	1	103	0	81	4	125	583
3	171	3	27	0	251	5	178	118	0	753
4	251	0	10	0	142	134	40	265	0	842
5	474	3	53	0	0	300	0	42	2	874
6	110	0	0	0	160	22	29	6	100	427
7	178	5	0	0	3	0	5	206	12	409
8	195	22	7	7	48	0	124	190	22	615
Total	1961	41	130	8	880	529	575	869	261	5254

Table IIA shows the numerical distribution of the questions and exercises found in the workbooks that were classified under the heading of Organization of Ideas.

There were a total of three hundred sixty-three questions and exercises classified under Organization of Ideas. Of these, two hundred eighty-six questions and exercises were classified under Classify or Arrange. Eighty questions and exercises were classified under Collect information, pictures, etc. Fifteen questions and exercises were classified under Summarize. Eight questions and exercises were classified under Prepare a Special Report. Three questions and exercises were classified under Select Items Pertinent to the Topic. One exercise was classified under Outline. No questions or exercises were classified under the heading of Find Major or Minor Points.

TABLE IIA

Numerical distribution of questions and exercises classified under Higher Mental Processes - Organization of Ideas

Book	Select items pertinent to the topic	Classify or Arrange	Find Major Or Minor Points	Outline	Summarize	Collect Information Pictures, etc.	Prepare a special report	Total
1	0	55	0	0	2	1	3	61
2	0	15	0	0	0	2	2	19
3	2	55	0	0	2	0	0	59
4	0	73	0	0	0	0	0	73
5	0	0	0	1	8	33	0	42
6	0	26	0	0	0	12	0	38
7	0	3	0	0	1	0	2	6
8	1	59	0	0	2	2	1	65
Total	3	286	0	1	15	50	8	363

Table IIIA shows the numerical distribution of the questions and exercises found in the workbooks that were classified under the general heading of Supplementation and Use of Ideas.

There were a total of eight hundred fifty-eight questions and exercises classified under Supplementation and Use of Ideas. Of these two hundred twenty nine questions and exercises were classified under Draw Conclusions or Inferences from data. Two hundred seventeen questions and exercises were classified under Find Reasons or Explanations to support a statement. Ninety-one questions and exercises were classified under Apply Knowledge or Principles to new situations. Eighty-six questions and exercises were classified under Make Comparisons. Eighty-three were classified under Handwork to illustrate a principle. Fifty questions and exercises were classified under Make Generalizations. Forty-six were classified under Find Similarities or Differences. Thirty nine were classified under Show Relationships. Ten questions and exercises were classified under Find Examples or Applications. Six were classified under Create or Invent new combinations of ideas. One was classified under Suggest Additional Topics for Study. There were no questions or exercises classified under Suggest Plans for Activities to the topic.

TABLE IIIA

Numerical Distribution of questions and exercises classified under Higher Mental Processes - Supplementation and Use of Ideas

Book	Find examples or Applications	Suggested plan or activity allied to topic	Suggested additional topics for study	Show relationships	Apply knowledge or principles to new situations	Draw conclusions or inferences from data	Find Reasons or explanations to support a statement	Make generalizations	Create or invent new combinations of ideas	Handwork or activities to illustrate a fact or principle	Make comparisons	Find Similarities, or differences	Total
1	5	0	0	8	12	19	59	3	0	5	10	11	132
2	1	0	0	3	8	28	18	1	3	8	4	3	77
3	0	0	0	6	14	52	5	37	0	20	15	15	164
4	0	0	0	6	5	36	34	0	0	22	6	0	109
5	1	0	0	0	5	24	19	0	3	2	6	4	64
6	0	0	0	0	1	1	1	1	0	3	2	0	9
7	0	0	1	2	16	23	27	0	0	7	14	1	91
8	3	0	0	14	30	46	54	8	0	16	29	12	212
Total	10	0	1	39	91	229	217	50	6	83	86	46	858

Table IVA shows the numerical distribution of questions and exercises found in the workbooks that were classified under the general heading of Criticism and Evaluation of Ideas.

There were a total of three hundred fifty questions and exercises classified under Criticism and Evaluation of Ideas. Of these, three hundred thirty questions and exercises were classified under Evaluating Evidence or Explanations. Ten questions and exercises were classified under Analyzing Methods or Motives. Eight questions and exercises were classified under Eliminating unimportant or irrelevant material. Two questions and exercises were classified under Recognizing Special Merit of ideas presented. No questions and exercises were found under the classifications: Finding Exceptions to the point made, Suggesting Limitations or Precautions, Discriminating between Fact and Opinion, Discovering Bias or Prejudice, Discovering Over-Generalizations, and Evaluating Suitability for a particular purpose.

TABLE IVA

Numerical distribution of questions and exercises classified under Higher Mental Processes - Criticism and Evaluation of Ideas (Critical Thinking)

Book	Recognizing special merit of ideas presented	Finding Exceptions to Point Made	Suggestions, Limitations, or Precautions	Analyzing Methods or Motives	Discriminating Between Fact and Opinion	Discovering Bias or Prejudice	Discovering Over-Generalizations	Eliminating Unimportant or Irrelevant Material	Evaluating Evidence or Explanations	Evaluating Suitability for a particular Purpose	Total
1	0	0	0	0	0	0	0	0	125	0	125
2	0	0	0	1	0	0	0	0	26	0	27
3	0	0	0	2	0	0	0	8	45	0	55
4	0	0	0	0	0	0	0	0	83	0	83
5	2	0	0	4	0	0	0	0	5	0	11
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	1	0	1
8	0	0	0	3	0	0	0	0	45	0	48
Total	2	0	0	10	0	0	0	8	330	0	350

Table IB shows the percentage distribution of questions and exercises found in the workbooks that were classified under the general heading of Lower Mental Processes. There were a total of 5254 questions and exercises classified under this general heading. Of these, 38.10 per cent were classified under Aided Recall. Under this heading 37.32 per cent were classified under Aided Recall of facts in the text and 0.78 per cent were classified under Aided Recall of facts from other sources. A total of 2.63 per cent were classified under the heading of Unaided Recall. Of these, 2.48 per cent were classified under Unaided Recall of facts in the text and 0.15 per cent were classified under Unaided Recall of facts from other sources. There was a total of 54.30 per cent classified under the heading of Recognition. Of these, 16.75 per cent were classified under Multiple choice, 10.07 per cent were classified under True-False, 10.95 per cent were classified under Matching, 16.53 per cent were classified under Location of facts and places from Maps, charts, diagrams, tables and pictures. Under Reproduction-drawing maps, pictures and diagrams according to directions the percentage was 4.97.

TABLE IB

Percentage distribution of questions and exercises classified under Lower Mental Processes - Recall

Book	Aided Recall		Unaided Recall		Recognition				Reproduction	Total
	Facts in Text	Facts from other Sources	Facts in Text	Facts from other Sources	Multiple Choice	True-False	Matching	Locating & Indicating Facts & Places	Drawing and coloring maps and pictures by directions	
1	43.54	0.93	2.66	0	23.04	9.06	15.71	5.06	0	100%
2	43.73	0.17	2.23	0.17	17.67	0	13.90	0.69	21.44	100%
3	22.71	0.40	3.59	0	33.33	0.66	23.64	15.67	0	100%
4	29.81	0	1.19	0	16.85	15.91	4.76	31.47	0	100%
5	54.23	.34	6.06	0	0	34.33	0	4.81	.23	100%
6	25.76	0	0	0	37.47	5.15	6.79	1.41	23.42	100%
7	43.53	1.22	0	0	.73	0	1.22	50.37	2.93	100%
8	31.71	3.58	1.14	1.14	7.80	0	20.16	30.89	3.58	100%
Total	37.32	0.78	2.48	0.15	16.75	10.07	10.95	16.53	4.97	

Table IIB shows the percentage distribution of questions and exercises found in the workbooks that were classified under the general heading of Organization of Ideas.

There were three hundred and sixty-three questions and exercises classified under Organization of Ideas. Of these, 78.79 per cent were classified under Classify or Arrange. Under Collect Information and pictures, were classified 13.77 per cent of the questions and exercises classified under Organization of Ideas. Under Summarize were classified 4.13 per cent of the questions and exercises classified under Organization of Ideas. Under Prepare a Special Report were classified 2.20 per cent of the questions and exercises classified under Organization of Ideas. Under Select Items pertinent to the topic were classified 0.83 per cent of the questions and exercises classified under Organization of Ideas. Under Outline were classified 0.28 per cent of the questions and exercises classified under Organization of Ideas. No questions and exercises were classified under Find Major or Minor Points.

TABLE IIB

Percentage distribution of questions and exercises classified under Higher Mental Processes - Organization

Book	Select items Pertinent to the topic	Classify or Arrange	Find Major or Minor Points	Outline	Summarize	Collect Information' Pictures, Etc. Illus.Topic	Prepare a Special Report
1	0	90.16	0	0	3.28	1.64	4.92
2	0	78.94	0	0	0	10.53	10.53
3	3.39	93.22	0	0	3.39	0	0
4	0	100.00	0	0	0	0	0
5	0	0	0	2.38	19.05	18.57	0
6	0	68.42	0	0	0	31.58	0
7	0	50.00	0	0	16.67	0	33.33
8	1.54	90.76	0	0	3.08	3.08	1.54
Total	0.83	78.79	0	0.28	4.13	13.77	2.20

Table IIIB shows the percentage distribution of questions and exercises found in the workbooks that were classified under the general heading of Supplementation and Use of Ideas.

There were 858 questions and exercises classified under Supplementation and Use of Ideas. Of these, 26.69 per cent were classified under Draw Conclusions or Inferences from data. Under Find Reasons or Explanations to support a statement were classified 25.29 per cent of the questions and exercises classified under Supplementation and Use of Ideas. Under Apply Knowledge or Principles to new Situations were classified 10.61 per cent of the questions and exercises classified under Supplementation and Use of Ideas. Under Handwork to illustrate a fact or principle were classified 9.67 per cent of the questions and exercises classified under Supplementation and Use of Ideas. Under Find Similarities or Differences were classified 5.07 per cent. Under Make Generalizations were classified 5.51 per cent. Under Show Relationships were classified 4.54 per cent. Under Find Examples were classified 1.16 per cent. Under Create or Invent New Combination of Ideas were classified 0.70 per cent. Under Suggest Additional Topics for study were classified 0.12 per cent of the questions and exercises. There were no questions or exercises classified under Suggest plans for Activity Allied to Topic.

TABLE IIIB

Percentage distribution of questions and exercises classified under Higher Mental Processes - Supplementation and Use of Ideas (Associative or Elaborative Thinking)

Book	Find examples	Suggest plans for activities allied to topic	Suggest additional topics for study	Show relationships	Apply knowledge or principles to new situations	Draw conclusions or inferences from data	Find Reasons or explanations to support a statement	Make generalizations	Create or Invent new combinations of ideas	Handwork or activities to illustrate a topic	Make comparisons	Find Similarities or Differences
1	3.79	0	0	6.06	9.09	14.39	44.70	2.27	0	3.79	7.58	8.33
2	1.29	0	0	3.90	11.39	36.36	23.38	1.30	3.90	10.39	5.19	3.90
3	0	0	0	3.18	8.54	31.71	3.04	22.56	0	12.19	9.15	9.15
4	0	0	0	5.50	4.59	33.03	31.19	0	0	20.18	5.51	0
5	1.56	0	0	0	7.81	37.50	29.69	0	4.69	3.13	9.37	6.25
6	0	0	0	0	11.11	11.11	11.11	11.11	0	33.34	22.22	0
7	0	0	1.10	2.20	17.58	25.28	29.67	0	0	7.69	15.38	1.10
8	1.42	0	0	6.60	14.15	21.70	25.47	3.77	0	7.55	13.68	5.66
Total	1.16	0	0.12	4.54	10.61	26.69	25.29	5.51	0.70	9.67	10.02	5.07

Table IVB shows the percentage distribution of questions and exercises found in the workbooks that were classified under the general heading of Criticism and Evaluation of Ideas.

There were 350 questions and exercises classified under Criticism and Evaluation of Ideas. Of these, 94.28 per cent were classified under Evaluation of Evidence or Explanations. Under Analyzing Methods or Motives were classified 2.87 per cent of the questions and exercises classified under Criticism and Evaluation of Ideas. Under Eliminating Unimportant or Irrelevant material were classified 2.28 per cent of the questions and exercises classified under Criticism and Evaluation of Ideas. Under Recognizing Special Merit of Ideas were classified 0.57 per cent of the questions and exercises classified under Criticism and Evaluation of Ideas. There were no exercises classified under Find Exceptions to the point made, Suggesting Limitations or Precautions, Discriminating between fact and Opinion, Discovering Bias or Prejudice, Discovering Over-Generalizations, and Evaluating Suitability of a presentation for a particular purpose.

TABLE IVB

Percentage distributions of questions and exercises classified under Higher Mental Processes - Criticism and Evaluation of Ideas (Critical Thinking)

Book	Recognizing special merit of ideas presented	Finding exceptions to Point Made	Suggestions, Limitations, or Precautions	Analyzing Methods or Motives	Discriminating Between Fact & Opinion	Discovering Bias or Prejudice	Discovering Over-Generalization	Eliminating Unimportant or Irrelevant Material	Evaluating Evidence or Explanations	Evaluating Suitability for a particular Purpose
1	00.00	0	0	0.00	0	0	0	0.00	100.00	0
2	00.00	0	0	3.70	0	0	0	0.00	96.30	0
3	00.00	0	0	3.64	0	0	0	14.54	81.82	0
4	00.00	0	0	0.00	0	0	0	0.00	100.00	0
5	36.36	0	0	18.18	0	0	0	0.00	45.46	0
6	00.00	0	0	0.00	0	0	0	0.00	0.00	0
7	00.00	0	0	0.00	0	0	0	0.00	100.00	0
8	00.00	0	0	6.25	0	0	0	0.00	93.75	0
Total	00.57	0	0	2.87	0	0	0	2.28	94.28	0

Table VA shows the numerical distribution of the questions of the questions and exercises found in the workbooks that were classified under the major levels or divisions: Lower Mental Processes (Recall, Recognition and Reproduction) and the Higher Mental Processes, (Organization of Ideas, Supplementation and Use of Ideas, and Criticism and Evaluation of Ideas).

There were a total of 6825 questions and exercises in the eight workbooks used in the study. Of these, 5,254 were classified under Lower Mental Processes. Three hundred sixty three questions and exercises were classified under Organization of Ideas. Eight hundred fifty-eight questions and exercises were classified under Supplementation and Use of Ideas. Three hundred fifty questions and exercises were classified under Criticism and Evaluation of Ideas. There were a total of 1571 questions and exercises classified under the general heading of Higher Mental Processes.

TABLE VA

Numerical distribution of the questions and exercises under the Main Classifications

Book	Lower Mental Processes	Higher Mental Processes			Total
		Organization of Ideas	Supplementation and use of Ideas	Criticism and Evaluation of Ideas	
1	751	61	132	125	1069
2	583	19	77	27	706
3	753	59	164	55	1031
4	842	73	109	83	1107
5	874	42	64	11	991
6	427	38	9	0	474
7	409	6	91	1	507
8	615	65	212	48	940
Total	5254	363	858	350	6825

Table VB shows the percentage distribution of the questions and exercises found in the workbooks that were classified under the major levels or divisions: Lower Mental Processes, (Recall, Recognition, and Reproduction) and the Higher Mental Processes (Organization of Ideas, Supplementation and Use of Ideas, and Criticism and Evaluation of Ideas.)

Of the total of 6825 questions and exercises found in the workbook 76.98 per cent were classified under the Lower Mental Processes. The questions and exercises classified under the general heading Higher Mental Processes made up 23.02 per cent of the total. Under Organization of Ideas were classified 5.32 per cent of the total. Under Supplementation and Use of Ideas were classified 12.57 per cent of the total. Under Criticism and Evaluation of Ideas were classified 5.13 per cent of the total.

TABLE VB

Percentage distribution of the questions and exercises Under the Main Headings

Book	Lower Mental Processes	Higher Mental Processes		
		Organization of Ideas	Supplementation and use of ideas	Criticism and Evaluation of Ideas
1	70.25	5.71	12.35	11.69
2	82.58	2.69	10.91	3.82
3	73.04	5.72	15.91	5.33
4.	76.06	6.59	9.85	7.50
5	88.19	4.24	6.46	1.11
6	90.08	8.02	1.90	0.00
7	80.67	1.19	17.95	0.20
8	65.42	6.92	22.55	5.11
Total	76.98	5.32	12.57	5.13

Table VI shows the numerical and percentage distribution of the total number of questions and exercises found in the eight geography workbooks used in this study under the general classifications: Lower Mental Processes and the Higher Mental Processes, Organization of Ideas, Supplementation and Use of Ideas, and Criticism and Evaluation of Ideas.

There were a total of six thousand eight hundred twenty-five questions and exercises in the eight workbooks used in this study. Of these, five thousand two hundred fifty-four questions and exercises, or 76.98 per cent, were classified under Lower Mental Processes. Eight hundred fifty-eight questions and exercises, or 12.57 per cent, were classified under Supplementation and Use of Ideas. Three hundred sixty-three questions and exercises, or 5.32 per cent, were classified under Organization of Ideas. Three hundred fifty questions and exercises, or 5.13 per cent were classified under Criticism and Evaluation of Ideas.

Table VII shows the distribution by number and per cent of the total number of questions and exercises under the two major classifications: Lower Mental Processes and Higher Mental Processes. There were a total of five thousand two hundred fifty-four questions and exercises or 76.98 per cent classified under Lower Mental Processes. There were a total of one thousand five hundred seventy-one questions and exercises or 23.02 per cent, classified under Higher Mental Processes.

TABLE VI

Numerical and Percentage Distribution of the Total Number of Questions and Exercises found in the Eight Workbooks used in this study

	Lower Mental Processes	Higher Mental Processes			Total Number of Questions and Exercises
		Organization of Ideas	Supplimentation and use of Ideas	Criticism and Evaluation of Ideas	
Total Number of Questions and Exercises	5254	363	858	350	6825
Percent of Questions and Exercises	76.98	5.32	12.57	5.13	

TABLE VII

Distribution by Number and Percent of total Number of Questions and Exercises under Two Major Classifications

	Distribution By Number	Distribution By Percent
Lower Mental Processes	5254	75.98
Higher Mental Processes	1571	23.02

CHAPTER V

SUMMARY AND CONCLUSIONS

The purposes of this study were: to analyze and classify the questions and exercises in a number of typical workbooks published for supplementary use in fifth-grade geography on the basis of the mental processes involved to answer the questions and do the exercises; to determine the extent to which the questions and exercises in these workbooks require the use of the higher mental processes as defined in this study.

The question of the suitability of these workbooks for the training of pupils in the use of the higher mental processes has long been a topic of considerable dissension. It was hoped that this study would help to shed some light on this question.

For purposes of this study the term higher mental processes is used to designate those mental processes involving a mental activity of a higher nature than mere recall or acquisition of facts, namely: organization of ideas, supplementation of ideas; and criticism and evaluation of ideas.

In carrying out the study, a classification of the various types of mental processes which children might be expected to engage in to complete the questions and exercises in fifth-grade geography workbooks was set up. All the questions and exercises in eight different geography workbooks, published for supplementary use, were analyzed and classified

according to the type of mental processes used. These were then compared on the basis of numerical distribution and on the basis of percentage distribution, both under the major classifications, and under the various sub-classifications under each major classification.

The conclusions of this study are as follows:

1. The study revealed that there were a total of 6,825 questions and exercises in the eight geography workbooks.

2. There were 5,254 questions and exercises classified under Lower Mental Processes, including Recall, Recognition, and Reproduction.

3. There were 1,571 questions and exercises classified under the Higher Mental Processes, including Organization of Ideas, Supplementation and Use of Ideas.

4. Of the total questions and exercises 76.98 per cent were classified under Lower Mental Processes.

5. Of the total questions and exercises 23.02 per cent were classified under Higher Mental Processes.

6. Of the total questions and exercises classified under Higher Mental Processes, 858, or 12.57 per cent were classified under Supplementation, and use of ideas; there were 363, or 5.32 per cent classified under Organization of Ideas, and 350, or 5.13 per cent were classified under Criticism and Evaluation of Ideas.

7. Results of this study indicate that by far the larger part of the questions and exercises in geography workbooks, published for supplementary use, necessitate only the use of the Lower Mental Processes, especially Recall and Recognition. Only a relatively small part make use of the skills associated with critical thinking deemed so necessary with enabling persons to meet the problems of life in democratic society.

8. The results of this study show a remarkable degree of similarity to the results obtained in a previous study of similar nature of the questions and exercises in fourth-grade geography textbooks, and indicate such workbooks offer no greater contribution toward training pupils in the use of the higher mental processes.

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